

METHOD FOR PREPARATION OF SEMICONDUCTIVE FILMS

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## METHOD FOR PREPARATION OF SEMICONDUCTIVE FILMS

### STATEMENT REGARDING FEDERAL RIGHTS

This invention was made with government support under Contract No. W-7405-  
5 ENG-36 awarded by the U.S. Department of Energy. The government has certain rights  
in the invention.

### FIELD OF THE INVENTION

The present invention relates to a deposition technique for semiconductive films and  
more particularly to the polymer assisted deposition of semiconductive films, especially  
10 thin semiconductive films. The polymer assisted deposition can be accomplished in an  
aqueous solution process.

### BACKGROUND OF THE INVENTION

Semiconductive films are used for photovoltaic and electro-optical devices. Such  
semiconductive materials have been previously deposited in the form of films by  
15 techniques such as reactive sputtering, co-evaporation techniques and chemical vapor  
deposition techniques.

Several methods of manufacturing thin-film solar cells are described by U.S.  
Patent Nos. 4,735,644, 5,538,903 (a paste deposition process), 5,728,231, 5,828,117 and  
5,994,163. Despite these various methods, improvements and new techniques have  
20 continually been sought.

An object of the present invention is to provide a process of forming semiconductive  
thin films through an initial chemical solution deposition method of metal oxide thin  
films followed by conversion of the metal oxide to a sulfide, selenide, and the like.

### SUMMARY OF THE INVENTION

25 To achieve the foregoing and other objects, and in accordance with the purposes of  
the present invention, as embodied and broadly described herein, the present invention  
provides for a process of preparing a semiconductive film including applying a solution  
including a soluble polymer and a soluble metal precursor onto a substrate to form a  
polymer and metal-containing layer thereon, treating said substrate including said  
30 polymer and metal-containing layer for a time to form a coherent composite film, heating